Device for the Power Controlling of PV Plants

POWER REDUCER BOX

User Manual

REDUCERBOX-BA-BEN110813 | 98-0018713 | Version 1.3

EN

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1 Information on this Document

This document describes the installation, mounting and commissioning of the Power Reducer Box. Keep this document in a convenient place for future reference.

1.1 Validity

This document is valid from firmware version 1.6.0

1.2 Target Group

This document is for electrically skilled persons and the user. Some tasks described in this document may only be performed by electrically skilled persons. These tasks are identified with safety warnings.

1.3 Symbols Used

The following types of safety precautions and general information appear in this document as described below.

DANGER!

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING!

"WARNING" indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION!

"CAUTION" indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE!

"NOTICE" indicates a situation that can result in property damage if not avoided.

Information

Information provides tips that are valuable for the optimal installation and operation of the product.

2 Safety

2.1 Appropriate Usage

With the Power Reducer Box it is possible to implement an active power limitation or a reactive power setpoint in accordance with the requirements of the grid management for a PV plant.

To this end four digital statuses (e.g. a radio ripple control receiver) can import into the Power Reducer Box and set the inverters in accordance with the requirements of the utility operator.

The four inputs can be freely configured via the integrated user interface. If a signal is issued by the radio ripple control receiver the Power Reducer Box evaluates the signal and relays an instruction via the Ethernet network to the registered Sunny WebBoxes. The Sunny WebBoxes contacted transfer the instruction to the connected inverters.

Events are recorded onto the internal memory of the Power Reducer Box. Additionally it is possible to save events onto an SD card or to download events via the user interface.

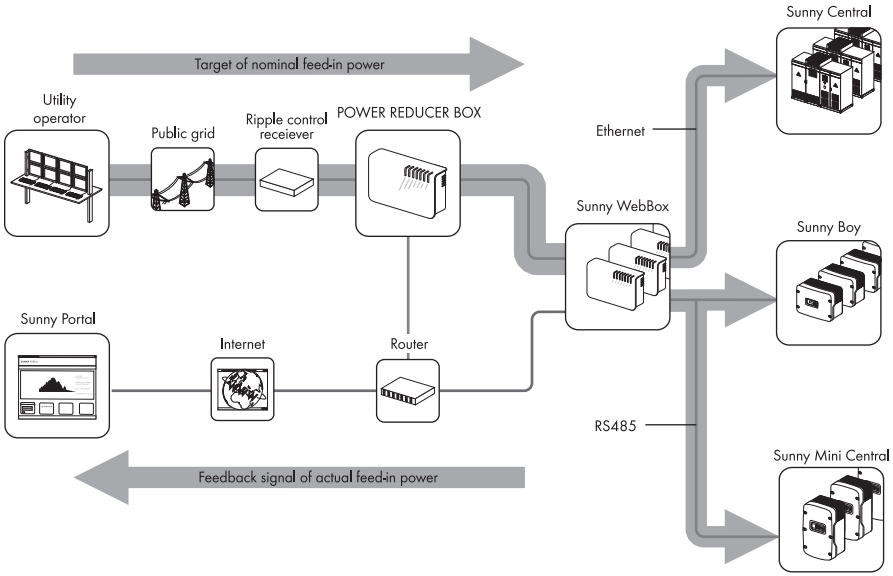


Illustration 1: Principle of the grid safety management with the Power Reducer Box

Power Reducer Box Functions Overview

- Integrated web server (for configuration of the Power Reducer Box).
- Log book, in which every event is saved along with a time stamp.
- HTTP download of the events in csv format.
- Support of up to 50 Sunny WebBoxes.
- Data transmission to the Sunny Portal internet portal.
- Saving of events onto SD cards.

Supported Devices

- All Sunny WebBoxes from firmware version 1.4.5
  - The transmission protocol of your plant must be set to SMA-NET.
  - The Sunny WebBoxes may not be operated in DHCP mode.

The Sunny WebBox with *Bluetooth*® Wireless Technology is **not** supported by the Power Reducer Box.

You will find an up to date list of the inverters supported by the Power Reducer Box in the user interface of the Power Reducer Box ("Status configuration > Compatibility list") or in the download area at www.SMA.de/en.

If you have further questions on supported inverters please contact the SMA Serviceline.

Operating Modes

- **Active Power Limitation**
  - Implementation of the instruction for power limitation in less than one minute.
  - Configurable delay time for reconnection to the 20 kV grid.

Active power limitation to 0%

At an active power limitation of 0% the inverters cannot be completely dimmed to 0 watts. A low residual power will continue to be fed-in depending on the inverter type in use.

- **Reactive Power Setpoint together with Active Power Output**
  - Fixed shift factor cos Phi (static setpoint).
  - Fixed reactive power in % of the maximum possible reactive power (static setpoint).

The Power Reducer Box is only suitable for use with original SMA Solar Technology AG accessories or with accessories recommended by SMA Solar Technology AG.

Please also refer to the technical data of the Power Reducer Box.

2.2 Safety Instructions

Electrical Connection

WARNING!

Risk of lethal electric shock as a result of incorrect work on the Power Reducer Box.

- All work on the Power Reducer Box may be performed by an electrically skilled person.

NOTICE!

Damage to the Power Reducer Box due to electrostatic discharges.

- All installation work on the Power Reducer Box should only be performed by an electrically skilled person.
- Avoid coming into contact with component connections and plug contacts.
- Ground yourself before working on the device.

NOTICE!

Safety-relevant parameters

Safety relevant parameters of the inverters in your PV plant can be changed using the Power Reducer Box. These parameters may normally only be changed after consultation with the electric utility company into whose grid you feed in.

If you have any doubts please contact your electric utility company.

Operating instructions

Inverters not supported in the PV system

Inverters not supported do not implement the parameters via the Power Reducer Box. The parameters of the utility operator can however be achieved. For this the status configuration of the Power Reducer Box must be adjusted so that the output of the supported inverters is more strongly controlled.

If the utility operator requires an active power limitation of 0%, the unsupported inverters must be disconnected via a suitable switching unit.

If in doubt please contact your utility operator or the SMA Serviceline before you commission the Power Reducer Box.

No DCHP Mode in the registered Sunny WebBoxes

In the event of changing IP addresses of the Sunny WebBoxes (e.g. in DHCP networks) the Power Reducer Box does not function correctly. Reset all Sunny WebBoxes to be registered by the Power Reducer Box to static IP addresses.

Data traffic via the RPC interface

Limitation instructions from the Power Reducer Box are sent via the Sunny WebBox RPC interface. Avoid additional data traffic via the Sunny WebBox RPC interface so as not to compromise the speed of the limitation instructions.

JavaScript

JavaScript must be activated in your browser.

Data Security

You can connect the Power Reducer Box to the internet. This, however, entails a security risk. SMA recommends changing the login password after the initial installation in order to protect it from unauthorized access by third parties. Select as your password a combination of numbers and letters with at least 8 characters (see section 9.1 "Setting the password" (page 45)).

3 Unpacking

3.1 Scope of Delivery

Check the scope of supply for completeness and any visible external damage. Please contact your dealer if the scope of delivery is not complete or you find any damage.

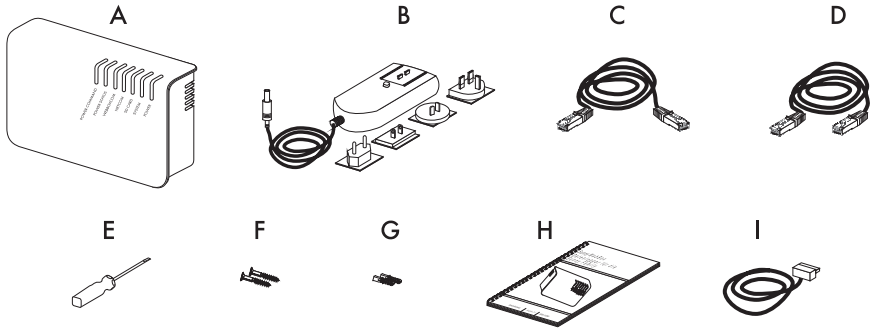


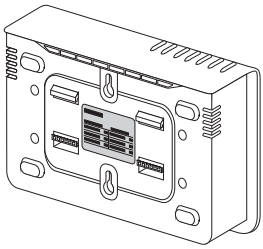
Figure 2: Components included in delivery

Position	Quantity	Description
A3	1	Power Reducer Box
B	1	Plug-in power supply with four adaptors
C	1	Red Ethernet cable (patch cable)
D	1	Blue Ethernet cable (crossover cable)
E	1	Screwdriver
F	2	Screws
G	2	Screw anchors
H	1	Technical description with drilling template and compatibility list
I	1	Pre-assembled cable (length 2.5 m) with 7 pole socket (for the connection of the radio ripple control receiver)

3.2 Identifying the Power Reducer Box

Type Label

You can identify the Power Reducer Box using the type label. The type label can be found on the underside of the enclosure. It contains information regarding the specific characteristics of the device, serial number, version and MAC address.



Firmware Version

The firmware version can be found on the user interface of the Power Reducer Box in the lower left corner.

4 Mounting

The Power Reducer Box can be mounted on a wall. For wall mounting, either direct mounting or mounting with a top-hat rail is possible.

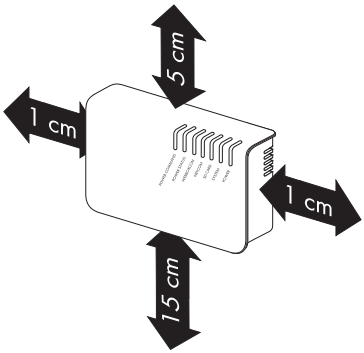
4.1 Mounting location

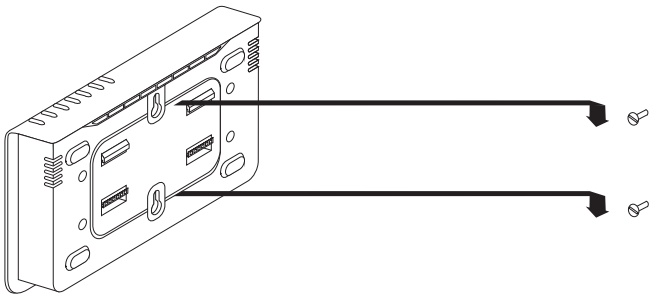
Ensure that the following ambient conditions are met for the Power Reducer Box:

- The Power Reducer Box is only suitable for mounting in enclosed areas.
- The ambient temperature must be between -20 °C and +60 °C during operation.
- The Power Reducer Box should be protected from dust, wet conditions, corrosive substances and vapors.
- The cable length of the digital connection between the Power Reducer Box and the radio ripple control receiver may be a maximum of 3 m.
- The device should be located near to a 230 V socket-outlet.
- The cable feeds require approx. 15 cm of space below the enclosure.
- Lay the cables so that the cables can not disconnect due to their own weight.
- Do not cover the Power Reducer Box. This can lead to heat accumulation in the device.
- You can mount the Power Reducer Box together with the necessary network technology (e.g. network switch, router, power supply) in one enclosure.

4.2 Mounting the Power Reducer Box on the Wall

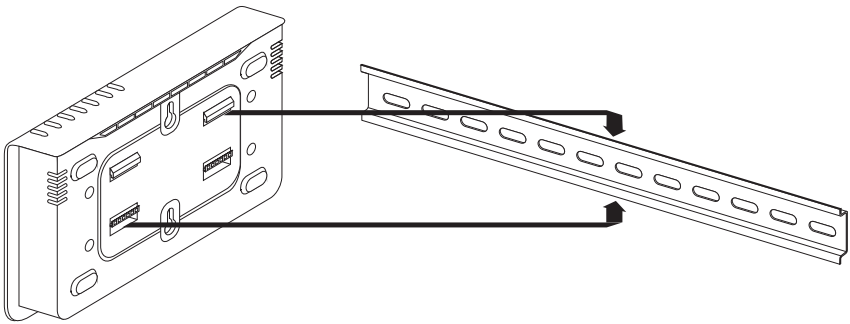
1. Determine the mounting location. Take the requirements for the mounting location into consideration here (see section 4.1).
2. Determine the position of the Power Reducer Box and mark the drilling holes using the frilling template.
3. Drill 6 a millimeter diameter hole at each of the marked spots.
4. Insert screw anchors into the holes.
5. Screw in the screws and leave approx. 6 mm protruding from the wall.
6. Hang the Power Reducer Box on the screws.





4.3 Mounting the Power Reducer Box on a top-hat rail

1. Hook the Power Reducer Box with both lower brackets under the lower edge of the top hat rail.
2. Push the Power Reducer box upwards and snap the top-hat rail into the upper brackets.



5 Connection

5.1 Overview of the Connection Area

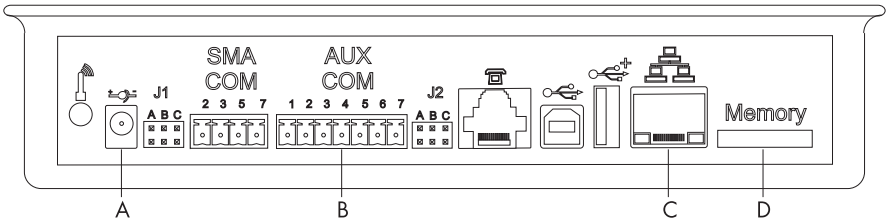


Illustration 3: Connection area

Position	Description
A	Connection for the plug-in power supply
B	AUXCOM for connection to the radio ripple control receiver
C	Ethernet connection
D	SD card slot

All other connections on the Power Reducer Box have no function.

5.2 Connecting the Power Reducer Box to the radio ripple control receiver

NOTICE!

Damage to the Power Reducer Box or the radio ripple control receiver due to incorrect connection.

- The connection of the Power Reducer Box to a radio ripple control receiver may only be performed by an electrically skilled person.

NOTICE!

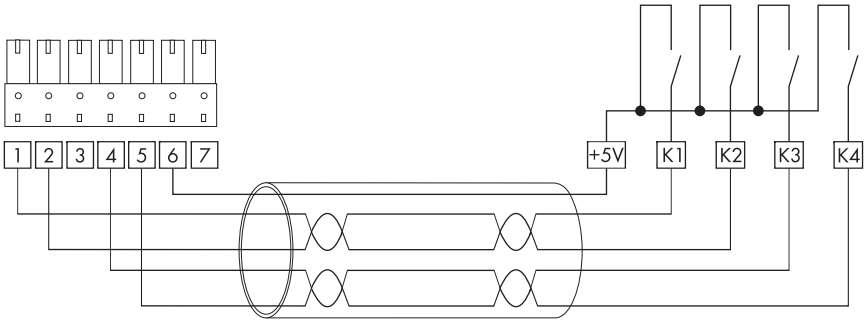
Damage to the Power Reducer Box due to too high input voltages.

- Use the +5 V insulated conductor from PIN 6 of the AUXCOM terminal for the control of the inputs via the relay contacts.
- Do not use any external voltages.

Configuration of the radio ripple control receiver

The configuration of the radio ripple control receiver is depends on the device and manufacturer.

1. Connect the pre-assembled cable to the radio ripple control receiver. The wiring is shown in the following circuit diagram.

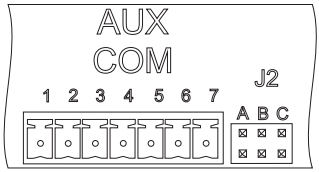


Wire color*	Signal	Power Reducer Box AUXCOM terminal	Description
Gray	+5 V	6	Voltage supply
White	K1	1	Relay contact 1
Brown	K2	2	Relay contact 2
Green	K3	4	Relay contact 3
Yellow	K4	5	Relay contact 4

* DIN 47100 without color repetition

2. Plug the 7 pole plug into the AUXCOM terminal of the Power Reducer Box.

☑ The Power Reducer Box is connected to the radio ripple control receiver.



6 Integrating the Power Reducer Box into the local network

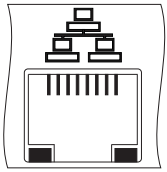
6.1 Procedure

Procedure		See
1	Connecting the Power Reducer Box to the computer	Section 6.2
2	Setting the PC to the Standard Network Settings of the Power Reducer Box	Section 6.3
3	When using a Proxy server: Setting the Proxy exception rule in Internet Explorer	Section 6.4
4	Setting the Power Reducer Box to local network settings	Section 6.5
5	Resetting the computer to previous network settings	Section 6.6
6	Connecting the Power Reducer Box to the local network	Section 6.7

6.2 Connecting the Power Reducer Box to the computer

1. Connect the Power Reducer Box with the blue Ethernet cable (Ethernet crossover cable) to the computer.

   The terminal on the computer is usually identified with the same symbol as the network terminal on the Power Reducer Box. If necessary, refer to the computer manual.



Recommendation on network cabling

If the supplied network cable is too short, please observe the following network cable requirements:

- You need an Ethernet crossover cable.
- Use a cable of type Cat5 or higher.
- Use a shielded cable.
- For a total length of no more than 100 m, observe the guidelines for structured cabling in accordance with EIA/TIA-568, ISO/IEC 11801 and/or EN 50173 (cable for fixed layout at least AWG24).
- For a total length of maximum 50 m you can use a cable with AWG26/7.

2. Switch on the Power Reducer Box (see section 7.1).

6.3 Setting the PC to the Standard Network Settings of the Power Reducer Box

Changing network settings

Do not change any values of the network settings if you are not sure of the consequences of the changes. It is possible to adjust the settings in such a way that your existing network no longer or only partially functions. In the worst case the Power Reducer Box can no longer be communicated with by the computer. In order to be able to make the changes to the network settings you require the necessary user rights on the computer. If in doubt contact your network administrator.

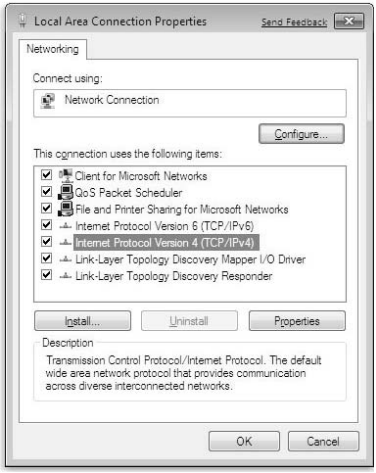
6.3.1 Windows Vista, Windows 7

1. Start the computer.
2. Select "Start" in Windows.
3. Enter "ncpa.cpl" in the search field and press enter.
   ☑ The "Network Connections" window opens.
4. Double-click on the LAN connection via which the Power Reducer Box is connected to the computer.
   – If windows displays several LAN connections, there are probably several network connections installed in the computer. Ensure that you select the correct network connection with which the computer is connected to the Power Reducer Box. If necessary, refer to the manual of your computer.
   – If no LAN connection is displayed, read section 13.3 "General Troubleshooting" (page 54).
   ☑ The "Local Area Connection Status" window opens.

5. In the "General" tab, select [Properties].

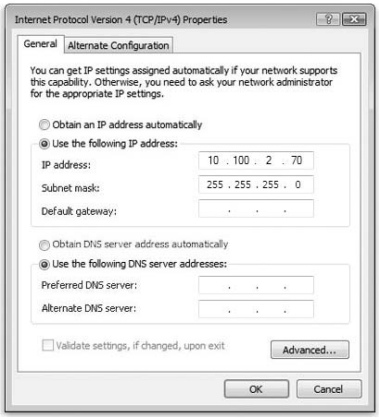
   ☑ The "Local Area Connection Properties" opens.

6. Check the "Internet Protocol Version 4 (TCP/IPv4)" box and select [Properties].



   ☑ The "Internet Protocol Version 4 (TCP/IPv4) Properties" window opens.

7. Make a note of the existing network settings of the "Internet Protocol Version 4 (TCP/IPv4) Properties" window. With this you can reset the computer to the previous network settings after configuration of the Power Reducer Box.


Internet Protocol Version 4 (TCP/IPv4) Properties
General
Alternate Configuration
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
10 . 100 . 2 . 70
Subnet mask:
255 . 255 . 255 . 0
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Validate settings, if changed, upon exit
Advanced...
OK
Cancel

8. Adjust the following static network settings for the computer:
   - Activate the "Use the following IP address" field.
   - Enter 10.100.2.70 into the "IP address" field.
   - Enter 255.0.0.0 into the "Subnet mask" field.
   - If the fields "Default gateway", "Preferred DNS server" or "Alternate DNS server" contain entries, delete these entries.
9. Select [OK].
10. In the "Local Area Connection Properties" window select [OK].

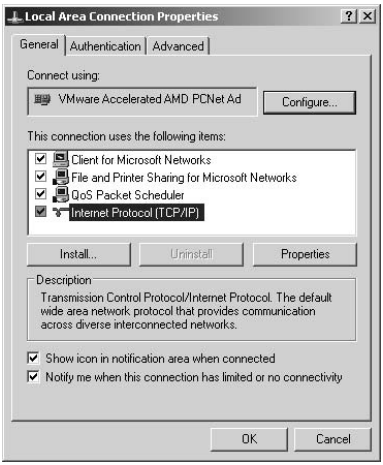
☑ The computer is set to the network settings of the Power Reducer Box.

6.3.2 Windows XP, Windows 2000

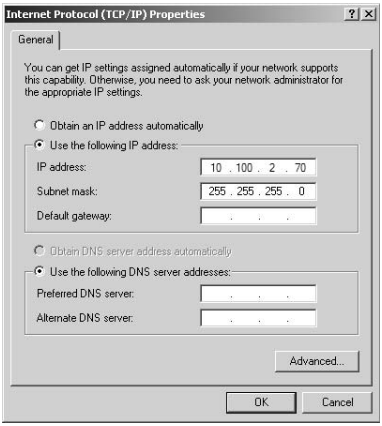
1. Start the computer.
2. In Windows select "Start > Control Panel > Network Connections".
3. Double-click on the LAN connection via which the Power Reducer Box is connected to the computer.
   - If windows displays several LAN connections, there are probably several network connections installed in the computer. Ensure that you select the correct network connection with which the computer is connected to the Power Reducer Box. If necessary, refer to the manual of your computer.
   - If no LAN connection is displayed, refer to section 13.3 "General Troubleshooting" (page 54).

   ☑ The "Local Area Connection Status" window opens.
4. In the "General" tab, select [Properties].

   ☑ The "Local Area Connection Properties" window opens.
5. Check the "Internet Protocol (TCP/IP)" box and select [Properties].



☑ The "Internet Protocol (TCP/IP) Properties" window opens.


Internet Protocol (TCP/IP) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address: 10 . 100 . 2 . 70
Subnet mask: 255 . 255 . 255 . 0
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Advanced...
OK
Cancel

6. Make a note of the existing network settings of the "Internet Protocol (TCP/IP) Properties" window. With this you can reset the computer to the previous network settings after configuration of the Power Reducer Box.
7. Activate the "Use the following IP address" field.
8. Adjusting the following network settings:
   - Activate the "Use the following IP address" field.
   - Enter 10.100.2.70 into the "IP address" field.
   - Enter 255.0.0.0 into the "Subnet mask" field.
9. If the fields "Default gateway", "Preferred DNS server" or "Alternate DNS server" contain entries, delete these entries.
10. Select [OK].

    ☑ The "Internet Protocol (TCP/IP) Properties" window closes.
11. In the "Local Area Connection Properties" window select [OK].
12. In the "Local Area Connection Status" window select [Close].

6.4 Setting up a Proxy Exception Rule in Internet Explorer

You must only set up a Proxy Exception Rule for the Power Reducer Box if there is an active Proxy server in your network.

Version of Internet Explorer

The following notations are valid for Internet Explorer 6. In Internet Explorer 5/7/8 the notations are similar and recognizable.

1. Start Internet Explorer.
2. In Internet Explorer select "Extras > Internet Options".

   ☑ The "Internet Options" window opens.
3. Select the "Connections" tab.
4. Select [Settings].
5. Select [Advanced].
6. In the field "Do not use a proxy server for addresses beginning with:", enter "10.100.*". If necessary, use semicolons to separate entries.
7. Confirm the entry with [OK] and close all further windows each with [OK].

   ☑ The Proxy Exception Rule is now set up.

8. Call up the home page of the Power Reducer Box via the Sunny Explorer address bar (http:\\10.100.2.1).
   ☑ The Power Reducer Box home page appears.

6.5 Setting the Power Reducer Box to local network settings

Network Administrator

If your local Ethernet network is managed by a network administrator, contact him/her before integrating the Power Reducer Box into your network.

You can allocate static network settings to the Power Reducer Box or obtain the network settings via a Dynamic Host Configuration Protocol-Server (DHCP-Server):

- When using the DHCP method, the DHCP server (normally the router, a switch can not do this) automatically assigns an IP address to the Power Reducer Box.
- If the network works without a DHCP server, you must assign a fixed IP address to the Power Reducer Box.

Assigning static network settings

For delivery, the static network settings of the Power Reducer Box are set to the following values:

IP Address:	10.100.2.1
Subnet mask:	255.0.0.0
Port:	80

1. Register as "Installer" on the home page of the Power Reducer Box (see section 8.1 "Logging into the Power Reducer Box" (page 27)).
   ☑ The "Plant Overview" page opens.
2. In the main menu select the button for "Network and system settings".
3. In "Network settings" make the following settings:
   – In the "Obtain IP address" field activate "Static".

Allocation of IP addresses

Each IP address may only appear once in the local network. The IP address may never have 0 or 255 as the last position.

   – In the "IP address" field enter the IP address at which the Power Reducer Box should be able to be contacted.
   – In the "Subnet mask:" field enter the subnet of your network. This mask limits the Ethernet network to certain IP addresses and separates network areas from one another.
   – In the "Gateway address" field enter the gateway address of your network. The gateway address is the IP address of the device that creates the connection to the internet. Normally the address of the router is entered here.

– In the "DNS server address" enter the address of the DNS server. The DNS (Domain Name System) server translates Internet addresses (e.g. www.SunnyPortal.com) into the respective IP addresses. Internet addresses are easier to remember than IP addresses. Here, enter the DNS server address that you received from your Internet Service Provider; alternatively you can also enter the IP address of your router.

4. Select [Save].

☑ The static network settings have been set.

Obtaining network settings dynamically (DHCP)

Requirement:

- There is an active DHCP server in your local network.

Use of DHCP

Before you set the Power Reducer Box to DHCP, check whether your DHCP server can extend the "Lease Time" of the IP address allocated. If the DHCP server allocates a new IP address upon expiry of the "Lease Time", SMA Solar Technology AG advises against the use of the DHCP server.

The DHCP server can list all devices that it has issued an IP address to. You can identify the Power Reducer Box in the DHCP server via its MAC address. You can read-off the MAC address of your Power Reducer Box from the type label (see section 3.2 "Identifying the Power Reducer Box" (page 13)).

1. Register as "Installer" on the home page of the Power Reducer Box (see section 8.1 "Logging into the Power Reducer Box" (page 27)).

   ☑ The "Plant Overview" page opens.

2. In the main menu select "Network and system settings".
3. In the "Obtain IP address" field activate "dynamic".
4. Select [Save].

☑ The Power Reducer Box acquires its IP address from the local network DHCP server.

6.6 Resetting the computer to previous network settings

- Reset the computer to the network settings noted. Thus you can again access your network.

6.7 Connecting the Power Reducer Box to the local network

The Power Reducer Box has an integrated network terminal. With this it can be connected to every Ethernet network. The terminal supports both Ethernet and Fast Ethernet networks (10 / 100 Mbit/s). Switching of the speed takes place automatically, depending on the connected switch, router or computer.

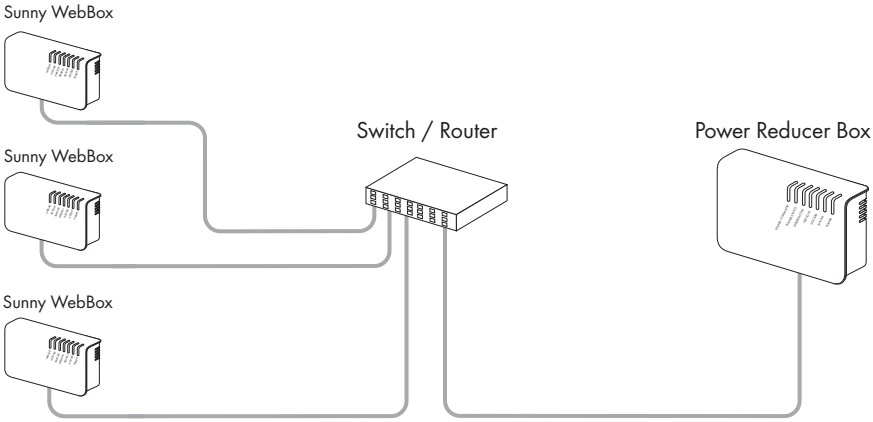
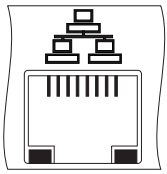


Illustration 4: Connection of the Power Reducer Box to the local network

1. Switch off the Power Reducer Box (see section 7.2).
2. Remove the blue Ethernet cable.
3. Connect the Power Reducer Box and switch or router together via the Ethernet terminals. Use the red Ethernet cable for this.



4. Switch on the Power Reducer Box (see section 7.1).

Recommendation on network cabling

If the supplied network cable is too short, please observe the following network cable requirements:

- Use a cable of type Cat5 or higher.
- Use a shielded cable.
- For a total length of no more than 100 m, observe the guidelines for structured cabling in accordance with EIA/TIA-568, ISO/IEC 11801 and/or EN 50173 (cable for fixed layout at least AWG24).
- For a total length of maximum 50 m you can use a patch cable with AWG26/7.

7 Switching the Power Reducer Box on and off

7.1 Switching the Power Reducer Box on

1. Connect the DC plug of the plug-in power supply to the Power Reducer Box.
2. Plug the plug-in power supply into the socket-outlet.

☑ The Power Reducer Box is switched on and after approx. 90 seconds is operational.

7.2 Switching the Power Reducer Box off

NOTICE

Possible loss of data from the SD card!

If you switch the Power Reducer Box off whilst data is being saved to the SD card, data from the SD card can be lost.

- Do not switch the Power Reducer Box if the "SD CARD" LED is flashing orange or green (see section 13.1).

- Pull the plug-in power supply out of the socket-outlet.

☑ The Power Reducer Box is switched off.

8 Operation

8.1 Logging into the Power Reducer Box

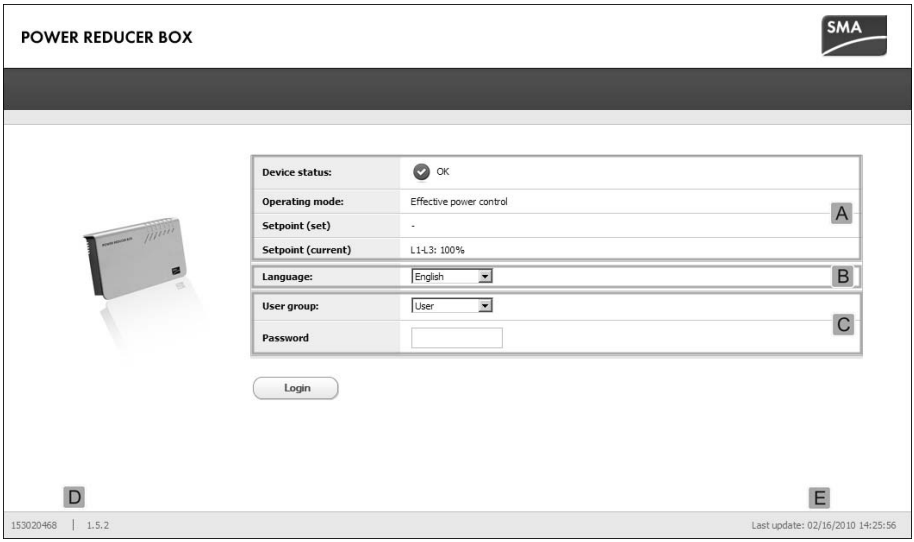


Illustration 5: Login page of the Power Reducer Box on the computer

Position	Description
A	Device status
B	Language selection
C	Login area
D	Serial number and software version
E	Last actualization of the page content

In order to be able to make changes to the Power Reducer Box settings you must log on.

The Power Reducer Box differentiates between three user groups:

- User
- Installer
- Service

Service user group

The Service user group is exclusively restricted to SMA Service employees.

In order to prevent two users effecting contradictory settings at the same time, only one user can ever be logged on to the Power Reducer Box at one time.

In addition to the rights of the "User" user group, the "Installer" user group has the following rights:

- Changing the status configuration
- Registration and editing of Sunny WebBoxes in the Power Reducer Box
- Resetting the "User" user group password

Logging out of the Power Reducer Box

Factory settings		
User group:	User	Installer
Password	0000	1111

1. In the browser, enter the IP address of your Power Reducer Box.
   ☑ The Power Reducer Box login page appears. If the login page does not open, check the electrical connection (page 16) and the network configuration (page 25).
2. Select the desired language in the "Language:" field.
3. Select the user group in the "User group:" field.
4. Enter the password in the "Password" field.
5. Select [Login].

☑ The Power Reducer Box home page appears.

Security

Once you have logged in for the first time, change your password in order to protect from unauthorized access (see section 9.1).

8.2 LED Overview

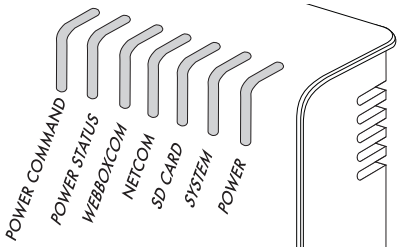


Illustration 6: LED overview

Legend	Meaning
POWER COMMAND	Validation of the parameter
POWER STATUS	Status of the output limitation
WEBBOXCOM	Communication with Sunny WebBox
NETCOM	Activity in the Ethernet network
SD CARD	Status of the SD card
SYSTEM	Operational readiness
POWER	Power supply

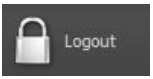
8.3 User Interface Overview

You can operate the Power Reducer Box via the user interface. The following illustration shows the partitioning of the web interface.

Illustration 7: User interface start page

Position	Description
A	Main menu
B	Context menu
C	Content area

8.3.1 Main menu

Button	Description	Function
	Status	This button opens the "Status" page (see section8.3.3 "Device Status" (page 31)).
	Events	This button opens the "Events" page (see section8.4 "Events" (page 32)).
	Network and system settings	This button opens the "Network and system settings" page of the Power Reducer Box.
	Logout	You can log out using this button.

8.3.2 Context menu

Menu item	Function
Sunny WebBox registration	This menu item opens the "Sunny WebBox registration" page (see section 8.5 "Sunny WebBox Registration in the Power Reducer Box" (page 34)).
Status configuration	This menu item opens the "Status configuration" page (see section 8.7 "Configuring operating modes" (page 38)).
Password settings	This menu item opens the "Password settings" page.
Sunny Portal settings	This menu item opens the "Sunny Portal settings" page (see section 8.6 "Sunny Portal" (page 36)).

8.3.3 Device Status

On the "Status" page an overview of the current status of the PV plant is given in the upper area. The following information is shown:

Device Status	The device status displays which overall status the Power Reducer Box is in.
Operating mode:	The operating mode displays which parameter the Power Reducer Box is currently implementing.
Setpoint (set)	The Setpoint (set) displays which values have been configured in the Power Reducer Box for the parameter.
Setpoint (current)	The Setpoint (current) displays which values are currently being implemented.
Status of the input ports	The status shows the current incoming signal of the radio ripple control receiver. K1 to K4 relate to the respective connected relays. If there is no signal, the value "Open" is displayed.

Display of the current status of the Power Reducer Box

The device status is also displayed on the login page of the Power Reducer Box.

In the lower area all Sunny WebBoxes registered in the Power Reducer Box are listed with their current communication status. A Sunny WebBox can have the following statuses:

Symbol	Status	Description
	OK	The communication between the Power Reducer Box and Sunny WebBox is functioning is correctly.
	Unknown	The communication status of the Sunny WebBox is currently unknown.
	Error	There is a communication error between the Power Reducer Box and the Sunny WebBox.

Updating the Device Status

Automatic updating of the page content

The page content is updated automatically every 30 seconds.

You can update the device status manually:

1. Select "Status" in the main menu.
2. Select [Refresh].

8.4 Events

On the "Events" page all events of the Power Reducer Box such as status change or errors in communication for example are recorded and displayed. All events are saved in the internal memory. Once the internal memory has reached its capacity, the oldest events will be written over. In addition you can download events in csv. Format as well as save events to an SD card.

8.4.1 Filtering and displaying events

1. Select "Events" in the main menu.
   ☑ The events of the current day are displayed.
2. If necessary, filter the events. For this, a checkmark must be placed in the relevant field. Multiple selection is possible. The following filter settings are possible:
   - Status change
   - Info
   - Warning
   - Disturbance
   - Error
3. Select time period.
4. Select [Refresh].

☑ The events in the desired time period are displayed.

8.4.2 Downloading events

You can download events as a text file in csv. format via the user interface. However, only events are downloaded that are currently displayed or have been filtered. The csv file uses UTF-8 character encoding.

1. Select "Events" in the main menu.
2. Select [Download].
3. Select the desired save location and confirm.

☑ The events are downloaded.

8.4.3 Saving events to an SD card

All events are saved automatically in the internal memory of the Power Reducer Box. Additionally you can save the events to an SD card.

Recording begins as soon as you slot the SD card into the SD card slot. The event of a certain day can first be saved to an SD card the following day.

If the SD card has reached its capacity, recording is stopped. Old data files are not overwritten on the SD card. If the SD card LED on the Power Reducer Box lights red, the SD card is full or write-protected.

Compatibility of the SD cards

In order to ensure the proper functioning of the SD card, use the SD cards available from SMA Solar Technology AG. Compatibility with all SD cards available on the market cannot be guaranteed. SD cards with a capacity of above 2 GB and SDHC cards are not supported.

Formatting of the SD card

Only use SD cards that are formatted with the FAT (FAT16) file system.

All events are saved onto the SD card daily to the directory /Year/Month/ Prefix_Year_Month_Day.csv. Example of a daily report from 1st July 2009 wit the standard prefix: / 2009/07/PRB_09_07_01.csv. All csv files use UTF-8 character encoding.

NOTICE!

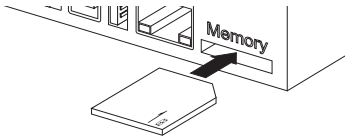
Loss of data due to premature removal of the SD card

If you remove the SD card before the writing process is finished the Power Reducer Box restarts. As a result data on the SD card can be lost.

- Do not remove the SD card if the "SD CARD" LED is flashing orange or green.

- Slot the SD card into the Power Reducer Box SD card slot.

☑ The events are saved in the internal memory and additionally to the SD card.



You can carry out further settings on the protocol file in the system settings of the Power Reducer Box (see section 9.4 "Setting Protocol Files" (page 46)).

8.5 Sunny WebBox Registration in the Power Reducer Box

The following settings may only be carried out by a trained electrically skilled person:

No removal or editing of Sunny WebBoxes during active Setpoint of the Power Reducer Box

Do not remove any Sunny WebBoxes and do not change any Sunny WebBox IP addresses in the Sunny WebBox registration if an Active Power Limitation (< 100%) or Reactive Power Setpoint is active.

8.5.1 Registering Sunny WebBox

All Sunny WebBoxes which are to be controlled by the Power Reducer Box must be registered via the user interface. The Sunny WebBoxes may not be operated in DHCP mode.

1. Select "Sunny WebBox registration" in the context menu.
2. In the upper area enter the settings for each Sunny WebBox to be registered:
   - In the "Name" field enter the name of the Sunny WebBox. The name can be freely allocated and serves the display on the "Status" page (maximum 20 characters). If no name is assigned, the IP address of the Sunny WebBox is registered as standard.
   - In the "IP address" field enter the IP address of the Sunny WebBox at which this is able to be contacted. The Sunny WebBox must have a fixed IP address and must not be in DHCP mode.
   - In the "Port" field enter the web server port of the Sunny WebBox at which it is able to be contacted. Port 80 is the default port here.
3. Select [Add].

☑ The newly registered Sunny WebBox appears in a list in the lower area.

Valid IP Address of the Sunny WebBox

It is not checked whether the IP address of the Sunny WebBox entered is a valid one. To see whether the Sunny WebBox has been correctly registered please refer to the status display on the "Status" page (see section 8.3.3).

You can enter further IP addresses of Sunny WebBoxes in the same way. Please note that a Power Reducer Box supports a maximum of 50 Sunny WebBoxes.

8.5.2 Editing / removing Sunny WebBox

Button	Description	Function
	Edit	Enables the editing of the Sunny WebBox registration.
	Remove	Removes a registered Sunny WebBox from the Power Reducer Box.

Editing Sunny WebBox

1. Select "Sunny WebBox registration" in the context menu.
2. In the list of the Sunny WebBoxes click on "Edit" after the desired Sunny WebBox.
   ☑ The Sunny WebBox to be edited is displayed in the upper area.
3. Adjust the Sunny WebBox settings.
4. Select [Save].

☑ The Sunny WebBox is displayed with changed values in the list of Sunny WebBoxes.

Removing Sunny WebBox

1. Select "Sunny WebBox registration" in the context menu.
2. In the list of the Sunny WebBoxes click on "Remove" after the Sunny WebBox to be removed.

☑ The Sunny WebBox is deleted from the list.User Manual

8.6 Sunny Portal

8.6.1 Information on the Sunny Portal

The Power Reducer Box can send data to the Sunny Portal internet portal. This data includes for example status information, system statuses and events. The data is displayed graphically in the Sunny Portal.

Events such as changes to the requirements of the utility operator, changes to the status configuration or disturbances for example can be saved in the Sunny Portal plant logbook. Additionally the Sunny Portal can inform you of actual events via E-mail (see Sunny Portal user manual).

Actuality of the data in Sunny Portal

´The Power Reducer Box sends data to the Sunny Portal as soon as events occur or settings are made via the user interface. Depending on your internet connection and the processing of the data in Sunny Portal the data in Sunny Portal could be displayed with a time delay.

8.6.2 Registering the Power Reducer Box in Sunny Portal

Requirement:

- Internet access is available.
- All Sunny WebBoxes of your plant are registered in the Power Reducer Box (see section 8.5).
- At least on Sunny WebBox of your plant is registered in Sunny Portal (see guide to the Sunny WebBox).

1. Login as "Installer" to the Power Reducer Box.
2. Select "Sunny Portal settings" in the context menu.
3. In the "Settings" area activate "Yes" in the "Use Sunny Portal:" field.
4. Via the "Communication monitoring:" drop-down list set how often the Power Reducer Box should report to the Sunny Portal. If the Power Reducer Box does not report within this set time period, the Sunny Portal can inform you via E-mail.

Regularity of communication monitoring when using a GSM modem

- If you create an internet connection via a GSM modem, set a low regularity for the communication monitoring. Depending on your GSM tariff you will therefore avoid increased costs.

5. If there is an active proxy server in your network, make settings for the proxy server:
   - Activate "Yes" in the "Use proxy server:" field.
   - Enter the address of the proxy server in the "Proxy server address" field.
   - In the "Port" field enter the network port at which the proxy server can be contacted.
   - If you have to authenticate for your proxy server the activate "Yes" in the "Use authentication" field and enter the user names and the password for the proxy server in the "User ID" and "Password" fields.
   - Select [Save].
6. In the "Registered plants request" area enter the login data with which your plant is registered in Sunny Portal.
   - In the "Operator e-mail:" field enter the e-mail address.
   - In the "Password" field enter the password with which you login to Sunny Portal.
   - Select [Request].
   - ☑ In the "Plant selection" area a list of the plants registered in Sunny Portal is displayed in the "Plant name:" drop-down list.
7. Select the desired plant in the "Plant name:" drop-down list.
8. Select [Select].

☑ In the "Settings" area the name of the plant appears in the "Plant name:" field and the plant identifier in the "Plant identifier:" field. The Power Reducer Box is registered in Sunny Portal.

8.6.3 Removing a Power Reducer Box registered in Sunny Portal from a plant.

In the following cases you must remove a Power Reducer Box registered in Sunny Portal from a plant:

- You selected the wrong plant during registration of the Power Reducer Box (see section 8.6.2).
- You have reset the Power Reducer Box (see section 10.2).

- Remove the Power Reducer Box in Sunny Portal (see Sunny Portal user manual section "Delete Device").

☑ You can re-register the Power Reducer Box in Sunny Portal (see section 8.6.2).

8.6.4 Deactivating data transmission to Sunny Portal

1. Login as "Installer" to the Power Reducer Box.
2. Select "Sunny Portal settings" in the context menu.
3. In the "Sunny Portal settings" area deactivate "Yes" in the "Use Sunny Portal:" field.

☑ The Power Reducer Box does not send data to the Sunny Portal.

8.7 Configuring operating modes

The 4 digital inputs of the Power Reducer Box (K1, K2, K3, K4) can accept up to 16 different input statuses. In consultation with the responsible utility operator each input status can be assigned a defined operating mode.

When the Power Reducer Box receives an instruction from the utility operator the inputs of the Power Reducer Box take on a defined status. If the Power Reducer Box evaluates this input status as valid, it switches to the operating mode that the input status was assigned with.

The Power Reducer Box evaluates an input status as valid under the following requirements:

- The input status is configured, i.e. the input status is assigned with an operating mode and the operating mode is configured.
- The input status is activated.

You can configure the following operating modes via the Power Reducer Box user interface:

Simple operating modes

- "Effective power control"
- "Reactive power setpoint"
- "Cos phi setpoint"

Combined operating modes

- "Active power limitation and reactive power setpoint"
- "Active power limitation and Cos phi setpoint"

Standard factory configuration

Input	Operating mode "Effective power control"	Meaning
K1	0%	No active power
K2	30%	Maximum 30% active power
K3	60%	Maximum 60% active power
K4	100%	Full active power

Requirements for the configuration of operating modes:

- Only trained electrically skilled persons may configure operating modes.
- Only configure operating modes in consultation with the responsible utility operator.
- Do not configure operating modes if an active power limitation, reactive power setpoint, cos phi setpoint or a combined setpoint is currently being implemented.

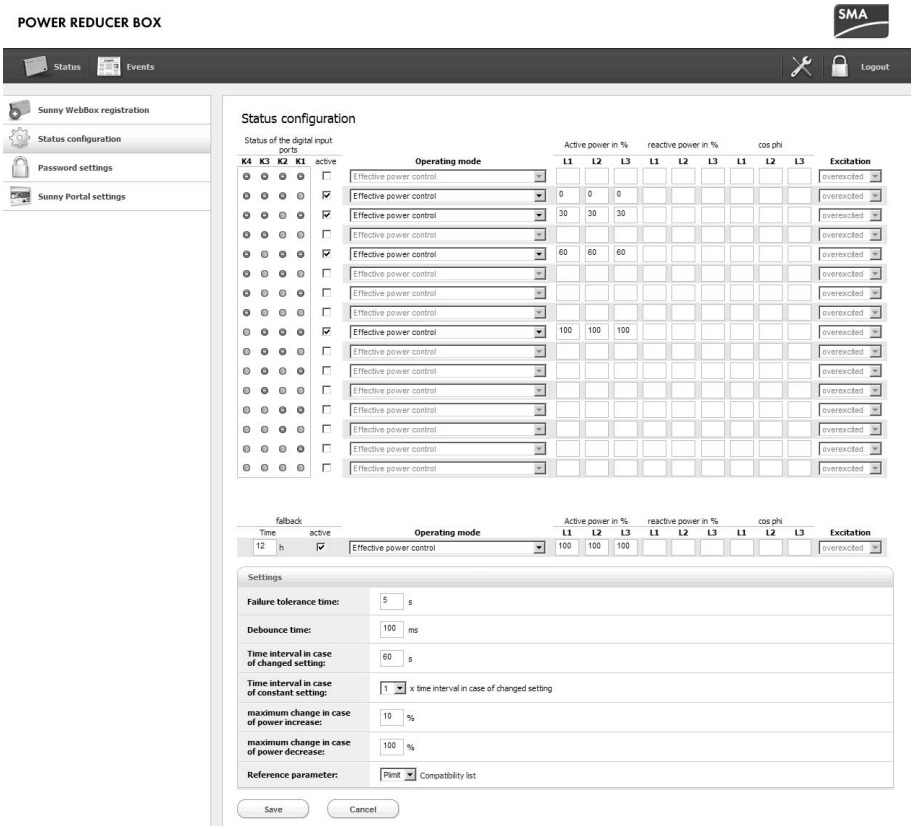


Illustration 8: "Status configuration"

8.7.1 Setting Active Power Limitation

Active power limitation to 0 %

At an active power limitation of 0 % the inverters cannot be completely dimmed to 0 watts. The inverter continues to feed in a low residual power.

1. Login as "Installer".
2. Select "Status configuration" in the context menu.
3. Search for the row with the status to be configured in the "Status of the digital input ports" column.
4. Place a check mark in the "Active" column next to the status to be configured.
   ☑ The status is active. Upon saving this will be evaluated by the Power Reducer Box.
5. In the "Operating mode" column select the value "Effective power control" of the status to be configured.

6. In the "Active power in %" column enter the active power in percent for the phases L1, L2 and L3 for the status to be configured.

   Different phases are only interpreted by inverters with multiple phases. Enter the same value for all phases in the case of single phase inverters.
7. Configure further statuses in the same way.
8. Take on general settings of the system statuses (see section 8.7.5 "Setting general system statuses" (page 42)).
9. Select [Save].

☑ The active power limitation is set.

8.7.2 Setting the Reactive Power Setpoint

1. Login as "Installer".
2. Select "Status configuration" in the context menu.
3. Search for the row with the status to be configured in the "Status of the digital input ports" column.
4. Place a check mark in the "Active" column next to the status to be configured.

   ☑ The status is active and upon saving this will be evaluated by the Power Reducer Box.
5. In the "Operating mode" column select the value "Reactive power setpoint" of the status to be configured.
6. In the "Reactive power in %" column enter the reactive power in percent for the phases L1, L2 and L3 for the status to be configured.

   Different phases are only interpreted by inverters with multiple phases. Enter the same value for all phases in the case of single phase inverters.
7. Configure further statuses in the same way.
8. Take on general settings of the system statuses (see section 8.7.5 "Setting general system statuses" (page 42)).
9. Select [Save].

☑ The reactive power setpoint is set.

8.7.3 Setting the cos Phi setpoint

1. Login as "Installer".
2. Select "Status configuration" in the context menu.
3. Search for the row with the status to be configured in the "Status of the digital input ports" column.
4. Place a check mark in the "Active" column next to the status to be configured.
   ☑ The status is active and upon saving this will be evaluated by the Power Reducer Box.
5. In the "Operating mode" column select "Cos phi setpoint" of the status to be configured.
6. In the "cos phi" column for the status to be configured enter the cos phi value for the phases L1, L2 and L3.

   The cos Phi value can be between 0.10 and 1.00. Different phases are only interpreted by inverters with multiple phases (see inverter manual). Enter the same value for all phases in the case of single phase inverters.
7. In the "Excitation" column, it is to be selected whether the cos Phi value is over- or under-excited.
8. Configure further statuses in the same way.
9. Take on general settings of the system statuses (see section 8.7.5 "Setting general system statuses" (page 42)).
10. Select [Save].

☑ The cos Phi value is set.

8.7.4 Configuring combined operating modes

Configuring combined operating modes

Note that for the combined operating modes the respective settings must be made as for the simple operating modes (see section 8.7.1to 8.7.3). If you have any doubts please contact SMA Solar Technology AG.

You can configure the following combined operating modes:

- "Active power limitation and reactive power setpoint"
- "Active power limitation and Cos phi setpoint"

8.7.5 Setting general system statuses

1. Login as "Installer".
2. Select "Status configuration" in the context menu.
3. In the "Failure tolerance time:" enter the desired failure tolerance time in seconds, from when an invalid input status is recognized as a failure. In practice it can happen that during a status change an invalid input status is present short-term, if e.g. two relays activate for 1 s at the same time. The failure tolerance time should be set to long enough so that no error message is generated during this transition of statuses.
4. In the "Debounce time:" field enter the desired Debounce time in milliseconds. The value states how long a signal must be present at a minimum of one input port, in order that it is recognized as such and then can be processed by the system. This setting prevents short impulses, caused by mechanical contact bounces, being falsely recognized as a signal during the status transition.
5. In the "Time interval in case of changed setting:" field enter the time interval in seconds, in which the control order to the registered Sunny WebBoxes is to be sent after the setpoint of the radio ripple control receiver has changed. Once the setpoint is reached, the Power Reducer Box switches to the status "Time interval in case of constant setting:" *Example: With an entry of 60 seconds, after the change of the setpoint the Power Reducer Box sends out a control order with the changed setpoint value every 60 seconds to the registered Sunny WebBoxes.*
6. In the "Time interval in case of constant setting:" field select the factor with which the value of the "Time interval in case of changed setting:" shall be multiplied. The "Time interval in case of constant setting:" specifies in which cycle the control order shall be sent to the Sunny WebBoxes, of the setpoint of the radio ripple control receiver is reached.
7. In the "maximum change in case of power increase:" field, enter the maximum, percentile change per minute after the lifting of an active power limitation (requirement for the reconnection of plants to the 20 kV grid: 10% of the connection active power per minute.*
8. In the "maximum change in case of power decrease:" field, enter the maximum percentile change per minute after a request for an active power limitation.
9. In the "Reference parameter:" field enter the reference parameter of the inverters. The reference parameter specifies to which value the active power limitation will refer. Ensure that your inverters support the set reference parameter (see "Compatibility list").
10. Select [Save].

☑ The configurations are saved.

*Technical directive "generating systems on the medium voltage gird", German Association of Energy and Water Industries e.V. (BDEW). , June 2008

8.8 "Fallback"

"Fallback" is an operating state into which the Power Reducer Box can enter if it evaluates an input status as invalid.

The Power Reducer Box evaluates an input status as invalid under the following requirements:

- The input status is not configured.
- The input status is not activated.
- The connection of the Power Reducer Box to the radio ripple control receiver is interrupted and additionally the upper constellation of the input statuses (K1 = 0, K2 = 0, K3 = 0, K4 = 0) on the "Status configuration" page is not configured and not activated.

The "fallback" prevents the Power Reducer Box from continuing to transfer settings to the Sunny WebBox in the event of an invalid input status which may no longer be up to date:

If the "fallback" is not activated and not configured, in the event of an invalid input status the Power Reducer Box retains the operating mode of the last valid input status (e.g. "Effective power control", "Reactive power setpoint" or "Cos phi setpoint"). If for example during an active power limitation an invalid input status is present, the Power Reducer Box continues to work in the "Effective power control" operating mode until a valid input status is again present. If the invalid input status remains unnoticed over a long period of time, this can lead to yield losses.

If the "fallback" is activated and configured, in the event of an invalid input status the Power Reducer Box retains the operating mode of the last valid input status for a limited period of time only. How long the Power Reducer Box retains the operating mode of the last valid input status depends on the time period that was set for the "fallback". A soon as the set time period expires, the Power Reducer Box switches to the operating mode that was assigned in the "fallback". In this way yield losses can be avoided.

As soon as a valid input status is present, the "fallback" is reset and the Power Reducer Box again sets the latest requirements of the distribution grid operator.

Configuring and activating "fallback"

Configure and activate "fallback" in consultation with the distribution grid operator

- Only configure and activate the "fallback" in consultation with the responsible distribution grid operator.

1. Login as "Installer" to the Power Reducer Box.
2. Select "Status configuration" in the context menu.
3. In the "Time" field in the "fallback" area enter the time interval after which the Power Reducer Box should switch to "fallback" in the event of an invalid input status. Enter a time interval of between 1 hour and 99 hours here.
4. Activate the "active" field.

Upper constellation of the status configuration with "fallback" activated.

If the connection of the Power Reducer Box to the radio ripple control receiver is interrupted, the following input status is present:

K1 = 0, K2 = 0, K3 = 0, K4 = 0

This equates to the upper constellation of the input statuses on the "Status configuration" page. If you have activated "fallback" you should not activate the upper constellation of the input statuses there. The Power Reducer Box will only evaluate an interrupted connection to the radio ripple control receiver as invalid and switch to "feedback" if the upper constellation of the input statuses is not activated.

5. In the "Operating mode" drop-down list select the desired operating mode for the "fallback".
6. Configure the desired operating mode (see section 8.7 "Configuring operating modes" (page 38)).
7. Select [Save].

Time measurement for "fallback"

The time measurement begins as soon as an invalid input status is present.

Adjusting settings for the "fallback" during a running time measurement has the following effects on the "fallback":

Setting	Effect on the fallback
• Changing the time interval for the "fallback"	The time measurement begins at 0. The newly set time interval is valid.
• Changes to the operating mode (effective power control, reactive power setpoint, cos phi setpoint) for the "fallback"	The time measurement continues without interruption. The newly set operating mode is valid.

If you reset the Power Reducer Box during running time measurement or switch the Power Reducer Box off (see section 7.2) the time measurement resumes as soon as the Power Reducer Box is again operational.

9 Settings

9.1 Setting the password

Password security

In order to increase the security, please note the following points when selecting a password:

- Minimum 8 characters
- Mix upper- and lower-case letters
- Use numbers and special characters

1. Select "Password settings" in the context menu.
2. In the "Change Passwords" area, carry out the respective settings:
   - Enter the old password in the "Old password" field.
   - Enter the new password in the "New password" field.
   - Re-enter the new password in the "Repeat password:" field.
3. Select [Save].

☑ The settings will be active at the next login.

9.2 Reset password

Resetting passwords of other user groups

The password of the "User" user group can also be reset in the "Installer" user group.

1. Select "Password settings" in the context menu.
2. In the "Reset password" area select the user group that is to be reset.
3. Select [Reset].

☑ The password is reset to the factory-set password and will be active at the next login.

9.3 Setting the Date and Time

Automatic Time Synchronization

If an automatic time synchronization with Sunny Portal should take place (a login to Sunny Portal is not necessary for this), place a checkmark at the "Time synchronization (via SUNNY PORTAL):". Manually entering the date and time is then not necessary. Note that the Power Reducer Box must have an internet connection.

1. In the main menu select "Network and system settings".
2. In the "New date: Day, Month, Year" field select the current date in the format Day-Month-Year.
3. In the "New time (hh:mm): 24h time format" enter the current time in the format Hour: Minutes.
4. In the "Timezone:" field select the time zone in which the PV plant is located.
5. Select [Save].

☑ The date and time are set.

9.4 Setting Protocol Files

1. In the main menu select "Network and system settings".
2. In the "Prefix for protocol files:" field select the prefix with which the filename of the protocol files shall begin with.
3. In the "Language in protocol files:" field select the language in which the events are to be written to the SD card.
4. Select [Save].

☑ Events are written to the SD card in the selected language.

10 Service Functions

10.1 Updating Firmware via an SD Card

Do not interrupt the update procedure!

The firmware update fails if you switch off the Power Reducer Box during the update procedure or remove the SD card too early.

- Do not switch off the Power Reducer Box and do not remove the SD card whilst the LEDs of the Power Reducer show a red chaser.

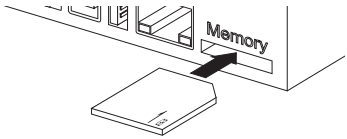
Restart of the Power Reducer Box during the Update

During the update the Power Reducer Box restarts. During the restart the Power Reducer Box does not implement settings. The settings made remain the same. After successful update the Power Reducer Box is again available via the user interface.

Formatting of the SD card

Only use SD cards that are formatted with the FAT (FAT16) file system.

1. Select the required update file in the downloads area of www.SMA.de and download it to your computer.
2. Connect the SD card to the computer.
3. Save the update file to the SD card and remove the SD from the computer.
4. Insert the SD card into the Power Reducer Box SD card slot.

   ☑ The update will be performed automatically. The update procedure takes approx. 15 minutes. A red chaser of the LEDs signalizes the running update procedure. After successful update the LEDs "POWER" "SYSTEM" and "SD CARD" are lit with a green light.
5. Remove the SD card from the Power Reducer Box.

10.2 Resetting the Power Reducer Box

The reset button is situated in a small hole on the rear side of the Power Reducer Box. Depending on how long you press the reset button, the Power Reducer Box performs the actions listed in the following table:

Duration	Action
Up to 1 second	Reset network settings
1 - 5 seconds	Reset network settings and passwords
5 - 15 seconds	Reset all Power Reducer Box settings to the factory settings (= delivered status).

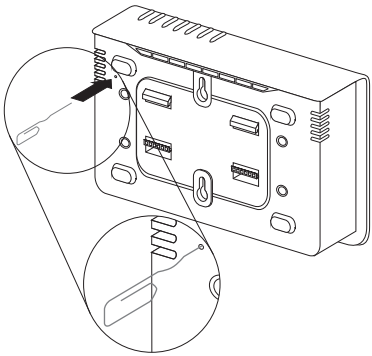
If you would like to restart the Power Reducer Box without resetting passwords and settings you must switch off the Power Reducer Box and then switch it back on again (see section 7).

Requirement:

- You are a trained electrically skilled person.
- The Power Reducer Box is supplied with voltage.

- Using a sharp object push the reset button in the hole.

☑ The Power Reducer Box is reset.



11 Maintenance and Care

11.1 Maintenance

Perform a visual inspection for external damage or soiling of the Power Reducer Box regularly.

11.2 Care

NOTICE!

Damage to the device due to ingress of liquids.

The Power Reducer Box is not waterproof. Protect the Power Reducer Box from wet conditions.

- When cleaning the device, only use a lightly damp cloth in order to prevent water from entering the device. If there is a considerable amount of dirt, you can also use a mild, non-abrasive, non-corrosive cleaning agent.

12 Decommissioning

12.1 Dismounting the Power Reducer Box

1. Switch off the Power Reducer Box (see section 7.2).
2. Remove DC plug of the plug-in power supply plug connector from the Power Reducer Box.
3. Remove the SD card from the Power Reducer Box SD slot.
4. Remove the cabling to the radio ripple control receiver.
5. Remove the Ethernet cable from the Power Reducer Box.
6. Dismantle the enclosure

   Top-hat rail mounting

   Remove the enclosure of the Power Reducer Box from the top-hat rail. To do so, lightly press the Power Reducer Box upwards, tilting the top edge forwards.

   Wall mounting

   Remove the enclosure of the Power Reducer Box from the wall. To do so, press the Power Reducer Box upwards, and pull it forwards.

☑ The Power Reducer Box is dismounted.

12.2 Packing the Power Reducer Box for Transport

When returning the device to us, please be sure to use packaging which adequately protects the device from damage during transport (if possible, the original packing).

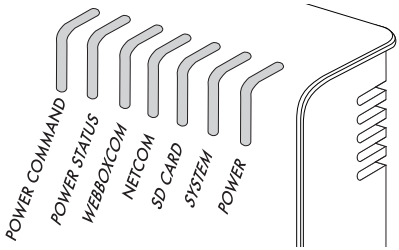
12.3 Disposing of the Power Reducer Box

Dispose of the Power Reducer Box at the end of its service life in accordance with the disposal regulations for electronic waste which apply at the installation site at that time, or send it back to SMA Solar Technology AG with shipping paid by sender, with the information "ZUR ENTSORGUNG" ("for disposal") on the packaging.

13 Troubleshooting

Some measures for troubleshooting may only be carried out by trained electrically skilled persons. These measures are indicated accordingly.

13.1 Status Displays of the LEDs

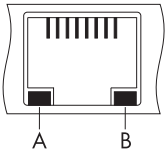


LED	Status	Meaning	Measure
POWER COMMAND	glows green	The input status is valid.	none
	glows red	The input status is invalid.	**Only trained electrically skilled persons:** • Check connection to radio ripple control receiver. • Check radio ripple control receiver. • Check status configuration for completeness and validity (see section 8.7).
POWER STATUS	glows green	Setpoint = 100%	none
	glows red	Output limitation active (< 100%)	none

LED	Status	Meaning	Measure
WEBBOXCOM	glows green	All registered Sunny WebBoxes are available.	none
	flashes orange	Not all registered Sunny WebBoxes are available.	**Only trained electrically skilled persons:** • Determine the deficient Sunny WebBox via the status display. Check Sunny WebBox and where necessary its cabling.
	flashes red	No Sunny WebBox is available.	**Only trained electrically skilled persons:** • Check cabling and Ethernet devices (e.g. router).
NETCOM	flashes green	Network activity	none
SD CARD	glows green	SD card is inserted and writable, > 10% free	none
	flashes green	Writing active, > 10 % free	none
	glows orange	SD card is inserted and writable, ≤ 10 % free	Replace SD card in the near future.
	flashes orange	Writing active, ≤ 10 % free	Replace SD card in the near future.
	glows red	The SD card is full or write-protected.	Replace SD card or remove the write protection.
	off	No SD card is inserted.	none
SYSTEM	glows green	The Power Reducer Box is ready for operation.	none
	glows orange	The Power Reducer Box is booting.	none
	flashes red	System error	Remove the plug-in power supply from the socket-outlet and after approx. 1 minute plug back in to the socket-outlet. **Only trained electrically skilled persons:** Reset the Power Reducer Box (see section 10.2)

LED	Status	Meaning	Measure
POWER	glows green	The Power Reducer Box is supplied with voltage.	none
	off	The Power Reducer Box is not supplied with power.	Check power supply.

13.2 Explanation of the LEDs at the Ethernet Connection



	LED	Condition	Function
A	Speed	off	10 Mbit/s Connection speed
		on	100 Mbit/s Connection speed
B	Link / Activity	off	No connection established
		on	Connection (Link) established
		flashing	Data is being transmitted or received (Activity)

13.3 General Troubleshooting

Problem	Cause	Measure
The Power Reducer Box is not available via the user interface.	The network connection of the Power Reducer Box is interrupted.	Ensure that the Power Reducer Box is correctly connected to the network (see section 6.7).
	The network settings of the computer do not correspond to the Power Reducer Box network settings.	Set the computer to the network settings of the Power Reducer Box (see section 6.3).
	The network settings of the router do not correspond to the Power Reducer Box network settings.	Set the router to the Power Reducer Box network settings. If necessary refer to your router manual.
	In Internet Explorer the proxy exception rule is not set for the Power Reducer Box.	Set the proxy exception rule (see section 6.4).
The Power Reducer Box does not send data to the Sunny Portal.	The Power Reducer Box is not registered in Sunny Portal.	Register the Power Reducer Box in Sunny Portal (see section 8.6.2).
	Use of the Sunny Portal is deactivated on the Power Reducer Box user interface.	On the "Sunny Portal settings" page activate "Yes" in the "Use Sunny Portal:" field.
LAN connection cannot be displayed in Windows.	No network card driver (Ethernet card) is installed or the network card is defective.	Check the installation of the network adaptor in the device manager and if necessary re-install the driver. Replace defective network card with a new one.

13.4 Error messages in connection with Sunny Portal

13.4.1 Error messages in the Event logbook

The following error messages will be displayed on the user interface of the Power Reducer Box and saved.

Certain error messages will be displayed in connection with an error type and an error code.

Error message	Error type	Error code	Cause	Measure
"Communication with the Sunny Portal is not possible. Error:" **or** "Upload failed. Error:"	"Firmware error"	"(255)"	The Power Reducer Box does not have enough memory.	Contact the SMA Serviceline.
		"(1313)"	Error during authentication.	
		"(1484)"	Invalid parameter	
	"Network error"	"(1) - (27)" "(29) - (46)"	Internet error during sending and receiving.	
		"(28)"	The Power Reducer Box is not correctly connected to the local network.	Ensure that the Power Reducer Box is correctly connected to the network (see section 6.7).
			The network settings of the computer and/or router do not correspond to the Power Reducer Box network settings.	Set the computer and/or router to the network settings of the Power Reducer Box (see section 6.3 and if necessary the router manual).
		"(305)"	The settings for the proxy server are not correct.	On the "Sunny Portal settings" page check the settings for the proxy server.

Error message	Error type	Error code	Cause	Measure
"Communication with the Sunny Portal is not possible. Error:" **or** "Upload failed. Error:"	"Network error"	"(400)"	Incorrect request of the Power Reducer Box.	Contact the SMA Serviceline.
		"(401)"	The data requested from the Power Reducer Box is access protected.	
		"(403)"	Access denied.	
		"(404)"	The Sunny Portal website can not be found	Check network settings
			The Sunny Portal server is not available.	If the Sunny Portal server is not available for more that 8 hours, contact SMA Serviceline.
			The network settings of the computer and/or router do not correspond to the Power Reducer Box network settings.	Set the computer and/or router to the network settings of the Power Reducer Box (see section 6.3 and if necessary the router manual).
			The Power Reducer Box is not correctly connected to the local network.	Ensure that the Power Reducer Box is correctly connected to the network (see section 6.7).
		"(405)"	Transfer method of the Power Reducer Box is not allowed on the Sunny Portal server.	Contact the SMA Serviceline.

Error message	Error type	Error code	Cause	Measure
"Communication with the Sunny Portal is not possible. Error:" **or** "Upload failed. Error:"	"Network error"	"(407)"	Authentication of the proxy server is necessary.	Check the network settings for the proxy server and activate authentication on the "Sunny Portal settings" page (see section 8.6.2).
		"(408)"	Timeout during request. The Sunny Portal may be overloaded.	Repeat process at a later time.
		"(500)"	Error in the Sunny Portal server.	Repeat process at a later time. If the error continues to persist, contact SMA Serviceline.
		"(502)"	The Sunny Portal server could not call up another server necessary for the request.	Check network settings
		"(503)"	Webservice is temporarily unavailable. The Sunny Portal may be overloaded or is currently down for maintenance.	Repeat process at a later time.

Error message	Error type	Error code	Cause	Measure
"Communication with the Sunny Portal is not possible. Error:" **or** "Upload failed. Error:"	"Network error"	"(504)"	Timeout at the Gateway. The Sunny Portal may be overloaded or is currently down for maintenance.	
"Communication with the Sunny Portal is not possible. Error:" **or** "Upload failed. Error:"	"Sunny Portal is busy"	"(1312)"	The Sunny Portal may be overloaded or is currently down for maintenance.	Wait until the Power Reducer Box automatically repeats the process at a later point in time.
"Sunny Portal is currently down for maintenance."	-	-	The Sunny Portal is currently undergoing maintenance work.	Wait until the Power Reducer Box automatically repeats the process at a later point in time.

13.4.2 Error during Portal Registration

Error messages which occur during the registration are displayed on the user interface of the Power Reducer Box on the "Sunny Portal settings" page.

Certain error messages will be displayed in connection with an error code.

Error message	Error code	Cause	Measure
"Sunny Portal not available."	-	The Sunny Portal may be down for maintenance.	Repeat process at a later time.
"Plant already registered."	-	The Power Reducer Box is already registered for a plant in Sunny Portal.	If desired, remove the Power Reducer Box from the plant in Sunny Portal and re-register (see section 8.6.3).
"The device cannot be registered. Error code: " **or** "Error. Please contact Service!"	"(1) - (46)"	Internet error during sending and receiving.	Contact the SMA Serviceline.
	"(305)"	The settings for the proxy server are not correct.	On the "Sunny Portal settings" page check the settings for the proxy server.
	"(400)"	Incorrect request of the Power Reducer Box.	Contact the SMA Serviceline.
	"(401)"	The data requested from the Power Reducer Box is access protected.	
	"(403)"	Access denied.	

Error message	Error code	Cause	Measure
"The device cannot be registered. Error code:" **or** "Error. Please contact Service!"	"(404)"	The Sunny Portal website can not be found.	Check network settings.
		The Sunny Portal server is not available.	If the Sunny Portal server is not available for more that 8 hours, contact SMA Serviceline.
	"(405)"	Transfer method of the Power Reducer Box is not allowed on the Sunny Portal server.	Contact the SMA Serviceline.
	"(407)"	Authentication of the proxy server is necessary.	Check the network settings of the proxy server and activate authentication on the "Sunny Portal settings" page (see section 8.6.2).
	"(408)"	Timeout during request. The Sunny Portal may be overloaded.	Repeat process at a later time.
	"(500)"	Error in the Sunny Portal server.	Repeat process at a later time. If the error continues to persist, contact SMA Serviceline.
	"(502)"	The Sunny Portal server could not call up another server necessary for the request.	Check network settings.
	"(503)"	The Webservice of the Sunny Portal server is temporarily unavailable. The Sunny Portal may be overloaded or is currently down for maintenance.	Repeat process at a later time.

Error message	Error code	Cause	Measure
"The device cannot be registered. Error code:" **or** "Error. Please contact Service!"	"(504)"	Timeout at the Gateway. The Sunny Portal may be overloaded or is currently down for maintenance.	Repeat process at a later time.
	"(1484)"	Invalid parameter	Contact the SMA Serviceline.
	"(1485)"	Unknown firmware version.	
	"(1312)"	Error in the Sunny Portal.	Repeat process at a later time. If the error continues to persist, contact SMA Serviceline.
	"(1313)"	Error during authentication.	Contact the SMA Serviceline.
"No plants available in Sunny Portal. Please check operator e-mail and/or password!"	-	There are no plants registered for the given user in Sunny Portal.	Register at least one Sunny WebBox in Sunny Portal. Register the Power Reducer Box with the user name and password given in Sunny Portal (see section 8.6.2).
"No plants available in Sunny Portal".	-	There are no plants registered for the given user in Sunny Portal.	Register at least one Sunny WebBox in Sunny Portal.

14 Technical Data

14.1 Power Reducer Box

Mechanical Data

Width x height x depth	255 mm x 130 mm x 57 mm
Weight	750 g
Degree of protection	IP20

Environmental conditions in operation

Ambient temperature	– 20 °C ... +60 °C
Relative humidity*	5 % ... 95 %
Maximum operating altitude above mean sea level	2 000 m
Degree of protection (IP)**	IP20

* Non condensing

** In accordance with DIN EN 60529

Environmental conditions during transport / storage

Ambient temperature	– 40 °C ... +70 °C
Relative humidity*	5 % ... 95 %
Maximum operating altitude above mean sea level	3 000 m

* Non condensing

Communication

Sunny WebBox*	Ethernet
Computer	Ethernet
Maximum range	100 m
Maximum number of Sunny WebBoxes*	50

* Without *Bluetooth* Wireless Technology

Mounting

Mounting location	Indoors
Type of mounting	Top-hat rail mounting, wall mounting

Memory

Internal memory	Ring buffer, 16 MB
Memory expansion through SD memory cards*	2 GB

* Optional

Voltage supply

Maximum power consumption	4 W

Connections

Radio ripple control receiver	4 digital inputs
Ethernet	RJ45*

*Data rate 10 Mbit or 100 Mbit per second

AUXCOM for digital inputs

Maximum closing resistance	1 kΩ
Minimum opening resistance	1 MΩ
Maximum input current per channel	20 mA
Output voltage	5 V*

* Nominal voltage

Languages

User interface language	German, English, French, Spanish, Czech

14.2 Plug-in power supply (CINCON, TRG30R 120)

Mechanical Data

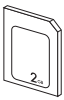
Width x height x depth	107.8 mm x 57.5 mm x 33.5 mm
Weight	300 g

Voltage supply

Voltage	100 V – 240 V AC, 50 / 60 Hz
Nominal current	0.8 A

15 Accessories

15.1 SD cards



2 GB SMA order number: SD-CARD2GB

16 Contact

If you have technical problems concerning our products, contact the SMA Serviceline. We need the following information in order to provide you with the necessary assistance:

- Information on the Ethernet network used.
- Information on the PV system.
- Configuration file and log file from the SD card.
- Firmware version of the Power Reducer Box (see section 3.2 "Identifying the Power Reducer Box" (page 13)) as well as the connected Sunny WebBoxes.

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